L Number	Hits	Search Text	DB	Time stamp
1	19157	frequency adj spectrum	USPAT	2003/11/13 10:01
2	11785	(frequency adj spectrum) and phase	USPAT	2003/11/13 10:01
3	5500	((frequency adj spectrum) and phase) and transform$	USPAT	2003/11/13 10:01
4	1306	(((frequency adj spectrum) and phase) and transform$) and smooth$	USPAT	2003/11/13 10:01
5	209	((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation	USPAT	2003/11/13 10:02
6	192	(((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation) and filter$	USPAT	2003/11/13 10:04
7	5	382/254-275	USPAT	2003/11/13 10:05
8	3246	382/254-275.ccls.	USPAT	2003/11/13 10:05
9	2	((((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation) and filter$) and 382/254-275.ccls.	USPAT	2003/11/13 10:07
10	1	5959966.pn.	USPAT	2003/11/13 10:07
11	1	5414782.pn.	USPAT	2003/11/13 10:07
12	1	5047968.pn.	USPAT	2003/11/13 10:08
13	1	5729631.pn.	USPAT	2003/11/13 10:08
14	1	6014468.pn.	USPAT	2003/11/13 10:08
15	1	5550935.pn.	USPAT	2003/11/13 10:08
16	1	5959966.pn.	USPAT	2003/11/13 10:08
17	1	6084227.pn.	USPAT	2003/11/13 10:08
18	1	5994690.pn.	USPAT	2003/11/13 10:09
19	1	5500685.pn.	USPAT	2003/11/13 10:09
20	1	5694484.pn.	USPAT	2003/11/13 10:09
21	1	5841911.pn.	USPAT	2003/11/13 10:09
22	1	5790709.pn.	USPAT	2003/11/13 10:09
23	1047	10-22	USPAT	2003/11/13 10:09
24	12	5959966.pn. 5414782.pn. 5047968.pn. 5729631.pn. 6014468.pn. 5550935.pn. 5959966.pn. 6084227.pn. 5994690.pn. 5500685.pn. 5694484.pn. 5841911.pn. 5790709.pn.	USPAT	2003/11/13 10:14
25	2	(5959966.pn. 5414782.pn. 5047968.pn. 5729631.pn. 6014468.pn. 5550935.pn. 5959966.pn. 6084227.pn. 5994690.pn. 5500685.pn. 5694484.pn. 5841911.pn. 5790709.pn.) and (frequency adj spectrum)	USPAT	2003/11/13 10:11
26	6	(5959966.pn. 5414782.pn. 5047968.pn. 5729631.pn. 6014468.pn. 5550935.pn. 5959966.pn. 6084227.pn. 5994690.pn. 5500685.pn. 5694484.pn. 5841911.pn. 5790709.pn.) and phase	USPAT	2003/11/13 10:13
27	5	((5959966.pn. 5414782.pn. 5047968.pn. 5729631.pn. 6014468.pn. 5550935.pn. 5959966.pn. 6084227.pn. 5994690.pn. 5500685.pn. 5694484.pn. 5841911.pn. 5790709.pn.) and phase) not ((5959966.pn. 5414782.pn. 5047968.pn. 5729631.pn. 6014468.pn. 5550935.pn. 5959966.pn. 6084227.pn. 5994690.pn. 5500685.pn. 5694484.pn. 5841911.pn. 5790709.pn.) and (frequency adj spectrum))	USPAT	2003/11/13 10:13
28	11	(5959966.pn. 5414782.pn. 5047968.pn. 5729631.pn. 6014468.pn. 5550935.pn. 5959966.pn. 6084227.pn. 5994690.pn. 5500685.pn. 5694484.pn. 5841911.pn. 5790709.pn.) and frequency	USPAT	2003/11/13 10:14
29	5	((5959966.pn. 5414782.pn. 5047968.pn. 5729631.pn. 6014468.pn. 5550935.pn. 5959966.pn. 6084227.pn. 5994690.pn. 5500685.pn. 5694484.pn. 5841911.pn. 5790709.pn.) and frequency) and phase	USPAT	2003/11/13 10:16
30	192	((((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation) and filter$) and phase	USPAT	2003/11/13 10:17

31	6	(((((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation) and filter$) and phase) and deconvolution	USPAT	2003/11/13 10:20
32	6	(((((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation) and filter$) and phase) and aberration	USPAT	2003/11/13 10:20
33	5	((((((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation) and filter$) and phase) and aberration) not (((((((frequency adj spectrum) and phase) and transform$) and smooth$) and degradation) and filter$) and phase) and deconvolution)	USPAT	2003/11/13 10:20

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[Abstract] [PDF Full-Text (3006 KB)] **IEEE JNL**

2 **Evaluation of the blur parameters from motion blurred images**
Yitzhaky, Y.; Kopeika, N.S.;
Electrical and Electronics Engineers in Israel, 1996., Nineteenth Convention of , 5-6 Nov. 1996
Page(s): 216 -219

[Abstract] [PDF Full-Text (340 KB)] **IEEE CNF**

3 **Restoration of images degraded by mechanical vibrations**
Hadar, O.; Adar, Z.; Cotter, A.; Yitzhaky, Y.; Kopeika, N.S.;
Electrical and Electronics Engineers in Israel, 1995., Eighteenth Convention of , 7-8 March 1995 -3.4.4/3

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[Abstract] [PDF Full-Text (372 KB)] **IEEE CNF**

5 **Restoration of images degraded by mechanical vibrations**
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Pattern Recognition, 1994. Vol. 3 - Conference C: Signal Processing, Proceedings of the 12th IAPR International Conference on , October 9-13, 1994

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1 **Suppression of scattering effect using frequency-distance relation in optical CT reconstruction**
Onodera, Y.; Kato, Y.; Shimizu, K.;
Lasers and Electro-Optics, 1999. CLEO/Pacific Rim '99. The Pacific Rim Conference on , Volume: 4 , 30 Aug.-3 Sept. 1999
Page(s): 1305 -1306 vol.4

[Abstract] [PDF Full-Text (88 KB)] **IEEE CNF**

2 **Restoration of medical ultrasound images using two-dimensional homomorphic deconvolution**
Taxt, T.;
Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on , Volume: 42 Issue: 4 , July 1995
Page(s): 543 -554

[Abstract] [PDF Full-Text (1224 KB)] **IEEE JNL**

3 **Bayesian 2-D deconvolution: effect of using spatially invariant ultrasound point spread functions**
Lango, T.; Lie, T.; Husby, O.; Hokland, J.;
Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on , Volume: 48 Issue: 1 , Jan. 2001
Page(s): 131 -141

[Abstract] [PDF Full-Text (1228 KB)] **IEEE JNL**

4 **Evaluation of two conjugate gradient based algorithms for**

quantitation in cardiac SPECT imaging
Sire, P.; Grangeat, P.; Iovleff, S.; La, V.; Mallon, A.;
Nuclear Science Symposium, 1996. Conference Record., 1996 IEEE , Volume: 3 , 2-9 Nov. 1996
Page(s): 1633 -1637 vol.3

[Abstract] [PDF Full-Text (416 KB)] **IEEE CNF**

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5 **Improvement of microassemblies ultrasonic images using adapted signal processing techniques**
Bechou, L.; Ousten, Y.; Tregon, B.; Danto, Y.; Salagoity, M.;
Electronics Manufacturing Technology Symposium, 1997., Twenty-First IEEE/CPMT International , 13-15 Oct. 1997
Page(s): 457 -462

[Abstract] [PDF Full-Text (616 KB)] **IEEE CNF**

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6 **A characterization of the scatter point-spread-function in terms of air gaps**
Wagner, F.C.; Macovski, A.; Nishimura, D.G.;
Medical Imaging, IEEE Transactions on , Volume: 7 Issue: 4 , Dec. 1988
Page(s): 337 -344

[Abstract] [PDF Full-Text (624 KB)] **IEEE JNL**

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7 **Degraded image analysis: an invariant approach**
Flusser, J.; Suk, T.;
Pattern Analysis and Machine Intelligence, IEEE Transactions on , Volume: 20 Issue: 6 , June 1998
Page(s): 590 -603

[Abstract] [PDF Full-Text (1348 KB)] **IEEE JNL**

Restoration of medical ultrasound images using two-dimensional homomorphic deconvolution

Taxt, T.
Section for Med. Image & Pattern Anal., Bergen Univ.;

This paper appears in: **Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on**

Publication Date: Jul 1995
On page(s): 543-554
Volume: 42, Issue: 4
ISSN: 0885-3010
References Cited: 28
CODEN: ITUCER
INSPEC Accession Number: 5036121

Abstract:
Describes how two-dimensional (2D) homomorphic deconvolution can be used to improve the lateral and radial resolution of medical ultrasound images recorded by a sector scanner. The recorded radio frequency ultrasound image in polar coordinates is considered as a 2D sequence of angle and depth convolved with a 2D space invariant point-spread function (PSF). Each polar coordinate sequence is transformed into the 2D complex cepstrum domain using the fast Fourier transform for Cartesian coordinates. The low-angle and low-depth portion of this sequence is taken as an estimate of the complex cepstrum representation of the PSF. It is transformed back to the Fourier frequency domain and is used to compute the deconvolved angle and depth sequence by 2D Wiener filtering. Two-dimensional homomorphic deconvolution produced substantial improvement in the resolution of B-mode images of a tissue-mimicking phantom in vitro and of several human tissues in vivo. It was better than lateral or radial homomorphic deconvolution alone, and better than 2D Wiener filtering with a PSF recorded in vitro

Index Terms:
biomedical ultrasonics deconvolution image restoration medical image processing 2D Wiener filtering 2D homomorphic deconvolution 2D sequence 2D space invariant point-spread function B-mode images Cartesian coordinates fast Fourier transform human tissues lateral resolution medical diagnostic imaging medical ultrasound images restoration polar coordinates radial resolution radio frequency ultrasound

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Degraded image analysis: an invariant approach

Flusser, J. Suk, T.
Inst. of Inf. Theory & Autom., Czechoslovak Acad. of Sci., Prague;
This paper appears in: **Pattern Analysis and Machine Intelligence, IEEE Transactions on**

Publication Date: Jun 1998
On page(s): 590-603
Volume: 20, Issue: 6
ISSN: 0162-8828
References Cited: 38
CODEN: ITPIDJ
INSPEC Accession Number: 5975645

Abstract:
Analysis and interpretation of an image which was acquired by a nonideal imaging system is the key problem in many application areas. The observed image is usually corrupted by blurring, spatial degradations, and random noise. Classical methods like blind deconvolution try to estimate the blur parameters and to restore the image. We propose an alternative approach. We derive the features for image representation which are invariant with respect to blur regardless of the degradation PSF provided that it is centrally symmetric. As we prove in the paper, there exist two classes of such features: the first one in the spatial domain and the second one in the frequency domain. We also derive so-called combined invariants, which are invariant to composite geometric and blur degradations. Knowing these features, we can recognize objects in the degraded scene without any restoration

Index Terms:
Fourier transforms image representation image restoration object recognition blind deconvolution blur degradations blurring composite geometric degradations degraded image analysis image representation invariant approach nonideal imaging system random noise spatial degradations spatial domain

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